Amendments to the Claims:

1.   (Currently Amended) A method for producing a circuit description of a design, the method comprising:

a)   from the design, selecting a <u>first</u> candidate sub-network that includes multiple circuit elements;

b)   generating a parameter based on a set of output <u>Boolean</u> functions performed by the <u>first</u> selected candidate sub-network;

c)   using the parameter to retrieve a <u>first</u> replacement sub-network from a storage structure that stores replacement sub-networks, wherein the <u>first</u> replacement sub-network comprises multiple circuit elements, ~~at least one circuit element being independently selectable~~;

d)   determining whether to replace the <u>first</u> selected candidate sub-network with the <u>first</u> replacement sub-network in the design;

e)   if determined to replace the <u>first</u> selected candidate sub-network, replacing the <u>first</u> selected candidate sub-network with the <u>first</u> replacement sub-network in the design; ~~and~~

~~f)   iteratively performing the selecting, generating, using, determining, and replacing, wherein during at least one iteration, a candidate sub-network selected from the design comprises at least one but not all circuit elements of a replacement sub-network in the design~~

f)   <u>from the design, selecting a second candidate sub-network that includes at least one but not all circuit elements of the first replacement sub-network; and</u>

g)   <u>replacing the second candidate sub-network in the design with a second replacement sub-network from the storage structure.</u>

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2.   (Currently Amended) A method for producing a circuit description of a design, the method comprising:

a)   from the design, selecting a first candidate sub-network that includes multiple circuit elements;

b)   generating a parameter based on a set of output Boolean functions performed by the first selected candidate sub-network;

c)   using the parameter to retrieve a first replacement sub-network from a storage structure that stores replacement sub-networks, wherein the first replacement sub-network comprises multiple circuit elements, ~~at least one circuit element being independently selectable~~;

d)   replacing the first selected candidate sub-network with the first replacement sub-network in the design; ~~and~~

~~e)   iteratively performing the selecting, generating, using, and replacing, wherein during at least one iteration, a candidate sub-network selected from the design comprises at least one but not all circuit elements of a replacement sub-network in the design~~

e)   from the design, selecting a second candidate sub-network that includes at least one but not all circuit elements of the first replacement sub-network; and

f)   replacing the second candidate sub-network in the design with a second replacement sub-network from the storage structure.

3.   (Currently Amended) The method of claim 2 further comprising identifying [[a]] the set of output Boolean functions performed by the first selected candidate sub-network.

4.   (Original) The method of claim 3, wherein the set of output functions includes

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only one output function.

5.   (Original) The method of claim 3, wherein the set of output functions includes a plurality of output functions.

6.   (Currently Amended) The method of claim 3, wherein each circuit element of the first selected candidate sub-network has an output, and each circuit element's output provides a result of one output function performed by the first selected candidate sub-network.

7.   (Currently Amended) The method of claim 3, wherein each circuit element of the first selected candidate sub-network has an output, and each output function performed by the first selected candidate sub-network is provided at only a circuit-element output that fans out of the first selected candidate sub-network.

8.   (Currently Amended) The method of claim 3, wherein a particular circuit element of the first selected candidate sub-network has more than one output, and each output of the particular circuit element provides a result of one output function performed by the first selected candidate sub-network.

9.   (Currently Amended) The method of claim 2 further comprising:

receiving a local function for each circuit element of the first selected candidate sub-network; and

identifying each output function from the received local functions.

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10.   (Currently Amended) The method of claim 9, wherein each local or output function is represented in terms of a binary decision diagram ("BDD"), and the _first_ selected candidate sub-network has at least first and second circuit elements, wherein the _first_ circuit element performs a first local function, and the second circuit element performs a second local function, wherein the BDD of a first output function is derived from the BDD of the first local function, and the BDD of a second output function is derived from the BDD's of at least the first and second local functions.

11.   (Previously Presented) The method of claim 2 further comprising

receiving the design, wherein the design is a combinational-logic network;

selecting additional candidate sub-networks; and

replacing at least some of selected additional sub-networks with replacement sub-networks retrieved from the storage structure;

wherein the replacement of the candidate sub-networks optimizes the combinational-logic network design.

12.   (Currently Amended) The method of claim 2 further comprising

receiving a logical representation of the design; and

converting the logical representation of the design to a circuit-level representation;

wherein selecting the _first_ candidate sub-network includes selecting the _first_ candidate sub-network from the circuit-level representation.

13.   (Currently Amended) The method of claim 2, wherein the parameter is an index for storing the _first_ replacement sub-network in the storage structure.

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14.   (Original) The method of claim 13, wherein the index is a numerical index.

15.   (Currently Amended) The method of claim 2, wherein the parameter is a set of indices for storing the <u>first</u> replacement sub-network in the storage structure.

16.   (Original) The method of claim 13, wherein the set of indices includes an index for each function in the set of output functions.

17.   (Original) The method of claim 16, wherein the indices are numerical indices.

18.   (Currently Amended) The method of claim 2 further comprising:

before replacing the <u>first selected</u> candidate sub-network with the <u>first</u> replacement sub-network, evaluating whether to replace the <u>first</u> selected candidate sub-network with the <u>first</u> replacement sub-network;

wherein said replacing is based on the evaluation.

19.   (Original) The method of claim 18, wherein the evaluating comprises computing a cost function.

20.   (Currently Amended) The method of claim 18 further comprising:

selecting additional candidate sub-networks;

for each candidate sub-network:

identifying at least one replacement sub-network for each selected

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candidate sub-network;

evaluating each identified replacement <u>sub-network</u>; and

based on the evaluations, determining whether to replace the candidate sub-network with the replacement sub-network identified for the candidate sub-networks.

21.   (Currently Amended) The method of claim 18, wherein using the parameter to retrieve the <u>first</u> replacement sub-network comprises using the parameter to retrieve several replacement sub-networks, the method further comprising:

evaluating each retrieved replacement sub-network to identify viable replacement candidates;

wherein the replacement sub-network that replaces the candidate sub-network is one of the viable replacement candidates.

22.   (Currently Amended) A computer readable medium storing a computer program which when executed by a computer produces a circuit description of a design, the program comprising:

a)   a first set of instructions for selecting, from the design, a <u>first</u> candidate sub-network that includes multiple circuit elements;

b)   a second set of instructions for identifying a set of output functions performed by the <u>first selected candidate</u> sub-network;

c)   a third set of instructions for retrieving, based on the identified set of output functions, a <u>first</u> replacement sub-network from a storage structure that stores replacement sub-networks, wherein the <u>first</u> replacement sub-network comprises multiple circuit elements, at least one circuit element being independently selectable;

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d)   a fourth set of instructions for replacing the first selected candidate sub-network with the first replacement sub-network in the design; and

~~e)   a fifth set of instructions for iteratively performing the selecting, identifying, retrieving, and replacing, wherein during at least one iteration, a candidate sub-network selected from the design comprises at least one but not all circuit elements of a replacement sub-network in the design~~

e)   a fifth set of instructions for selecting from the design, a second candidate sub-network that includes at least one but not all circuit elements of the first replacement sub-network; and

f)   a sixth set of instructions for replacing the second candidate sub-network in the design with a second replacement sub-network from the storage structure.

23.   (Original) The computer readable medium of claim 22, wherein the set of output functions includes only one output function.

24.   (Original) The computer readable medium of claim 22, wherein the set of output functions includes a plurality of output functions.

25.   (Canceled)

26.   (Currently Amended) A computer readable medium storing a computer program which when executed by a computer produces a circuit description of a design, the program comprising:

a)   a first set of instructions for selecting, from the design, a first candidate

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sub-network that includes multiple circuit elements;

b)   a second set of instructions for generating a parameter based on a set of output functions performed by the <u>first</u> selected candidate sub-network;

c)   a third set of instructions for retrieving, using the parameter, a <u>first</u> replacement sub-network from a storage structure that stores replacement sub-networks, wherein the <u>first</u> replacement sub-network comprises multiple circuit elements, ~~at least one circuit element being independently selectable~~;

d)   a fourth set of instructions for replacing the <u>first</u> selected candidate sub-network with the <u>first</u> replacement sub-network in the design; ~~and~~

~~e)   a fifth set of instructions for iteratively performing the selecting, generating, retrieving, and replacing, wherein during at least one iteration, a candidate sub-network selected from the design comprises at least one but not all circuit elements of a replacement sub-network in the design~~

<u>e)   a fifth set of instructions for selecting from the design, a second candidate sub-network that includes at least one but not all circuit elements of the first replacement sub-network; and</u>

<u>f)   a sixth set of instructions for replacing the second candidate sub-network in the design with a second replacement sub-network from the storage structure.</u>

27.   (Previously Presented) The computer readable medium of claim 26, wherein the set of output functions includes only one output function.

28.   (Previously Presented) The computer readable medium of claim 26, wherein the set of output functions includes a plurality of output functions.

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29.   (Currently Amended) The computer readable medium of claim 26, wherein the parameter is an index for storing the <u>first</u> replacement sub-network in the storage structure.

30.   (Currently Amended) The computer readable medium of claim 26 further comprising:

a set of instructions for, before replacing the <u>first</u> candidate sub-network, evaluating whether to replace the <u>first</u> selected candidate sub-network with the <u>first</u> replacement sub-network;

wherein said replacing is based on the evaluation.

31.   (Previously Presented) The computer readable medium of claim 30, wherein the set of instructions for evaluating comprises a set of instructions for computing a cost function.

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